

a1
cont.

8. (Added) A control method for a hybrid vehicle having a combustion engine for outputting a driving force; an electric motor for generating a force for assisting the output from the engine, depending on driving conditions; and a power storage unit for storing electric energy generated by the motor acting as a generator using the output from the engine and electric energy regenerated by the motor when the vehicle decelerates;

the control method comprising the steps of:

determining whether to assist the output from the engine by the motor based on a determination threshold value as the standard, depending on the driving conditions of the vehicle;

changing the air-fuel ratio of the mixture, which is to be supplied to the engine, to a condition leaner or richer than the stoichiometric air-fuel ratio; and

changing the determination threshold value depending on whether the air-fuel ratio of the mixture is leaner or richer than the stoichiometric air-fuel ratio.

#1

9. (Added) A control method according to claim 8, further comprising the step of prohibiting the change of the determination threshold value when the air-fuel ratio of the mixture is changed from the condition leaner than the stoichiometric air-fuel ratio to the condition richer than the stoichiometric air-fuel ratio.

#2

10. (Added) A control method according to claim 9, further comprising the step of terminating the prohibition of the change of the determination threshold value while the change of the determination threshold value is prohibited, when the air-fuel ratio of the mixture is determined

#3

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to be leaner than the stoichiometric air-fuel ratio, or when the prohibition of the change of the determination threshold value has been maintained for a specified time.

11. (Added) A control method for a hybrid vehicle having a combustion engine for outputting a driving force; and electric motor for generating a force for assisting the output from the engine, depending on driving conditions; and a power storage unit for storing electric energy generated by the motor acting as a generator using the output from the engine and electric energy regenerated by the motor when the vehicle decelerates;

the control system comprising the steps of:

determining whether to assist the output from the engine by the motor based on a determination threshold value as the standard, depending on the driving condition of the vehicle;

changing the air-fuel ratio of the mixture, which is to be supplied to the engine, to a condition leaner or richer than the stoichiometric air-fuel ratio; and

changing the determination threshold value depending on whether the air-fuel ratio of the mixture is leaner or richer than the stoichiometric air-fuel ratio;

measuring oxygen concentration in exhaust gas;

absorbing nitrogen oxide in the exhaust gas when the oxygen concentration in the exhaust gas is high;

reducing the absorbed nitrogen oxide when the oxygen concentration in the exhaust gas is low;

setting the air-fuel ratio of the mixture to a condition richer than the stoichiometric

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air-fuel ratio so as to reduce the oxygen concentration in the exhaust gas, when the air-fuel ratio of the mixture, which is to be supplied to the engine, is leaner than the stoichiometric air-fuel ratio; and prohibiting the change of the determination threshold value when the air-fuel ratio of the mixture is changed from the condition leaner than the stoichiometric air-fuel ratio to the condition richer than the stoichiometric air-fuel ratio.

15 12. (Added) A control method according to claim 11, further comprising the steps of detecting the speed of the vehicle, and setting the air-fuel ratio so as to reduce the oxygen concentration in the exhaust gas at a time interval depending on the vehicle speed detected.

16 13. (Added) A control method according to claim 11, further comprising the step of terminating the prohibition of the change of the determination threshold value while the change of the determination threshold value is prohibited, when the air-fuel ratio of the mixture is determined to be leaner than the stoichiometric air-fuel ratio, or when the prohibition of the change of the determination threshold value has been maintained for a specified time.

REMARKS

Claims 1-13 are pending in this application, of which claims 8-13 are newly-added.

As required by the Examiner, the title has been corrected to be more descriptive of the present invention.

The Examiner has objected to the drawings for failing to show the output assist determination device and the determination threshold value changer as disclosed in claim 1; the determination threshold value change prohibiting device as disclosed in claim 2; the terminating device as disclosed in claim 3; and the reduction device as disclosed in claim 4.

Similarly, claims 1-7 stand rejected under 35 USC §112, first and second paragraphs, for failing to show the separate "devices" as noted above. The Examiner has suggested that these "devices" are actually steps (e.g., output assist determination device is referred to as steps S122, S135) in a control method or commands in a program for a microprocessor/microcontroller.

In response, Applicants submit the following:

The output assist determination device (steps S122 and S135) is basically operated in a motor ECU and determines whether to assist the output from the engine by the motor based on a determination threshold value (the throttle assist trigger threshold value MTHAST, the air intake passage pressure assist trigger threshold value MAST, or the air intake passage pressure assist trigger threshold value MASTTH) as the standard.

The air-fuel controller is FIECU 12 shown in Fig. 1 and changes the air-fuel ratio of the mixture, which is to be supplied to the engine, to a condition leaner or richer than the stoichiometric air-fuel ratio.

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The determination threshold value changer (steps S251 and S301) is operated in FIECU 12 and changes the determination threshold value, depending on whether the air-fuel ratio of the mixture is leaner or richer than the stoichiometric air-fuel ratio. When an assist trigger calculation for MT or the CVT is performed, it is determined whether the lean burn determination flag F_KCMLB is "1". The determination threshold value is changed according to the result.

According to the control system for a hybrid vehicle having these devices, even in the case where the air-fuel ratio of the air-fuel mixture supplied to the engine is temporarily set to be richer than the stoichiometric air-fuel ratio by the air-fuel ratio controller, for example, in order to recover the absorption capacity of NOx absorbent when the absorbent is degraded, because the determination threshold value change prohibiting device forbids the operation of the determination threshold value change device, the determination threshold to be used for determining whether the electric motor assists the output of the engine remains unchanged. Therefore, the determination threshold for lean burn is continuously used in such a case, and it is possible to prevent a sudden change of driving state due to a change of the determination threshold, and the smoothness in driving a vehicle can thereby be improved.

Furthermore, the Examiner has urged that, for example, an "output assist determination device" and the like are indefinite.

However, it is submitted that these devices are defined in the specification. Of course, the "output assist determination assist device" responds to the driver's desires, for example, by supplying a motor assist to make up for the engine output shortfall so as to yield appropriate power output.

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In summary, devices such as "output assist determination device", "air-fuel controller", and "determination threshold value changer" described in claim 1; "determination threshold value change prohibiting device" described in claim 2; "terminating device" described in claim 3; and "reduction device" are all found in FIECU (12).

When a signal from a throttle valve opening sensor S6 for detecting the degree of throttle opening TH, and a signal from an air intake passage pressure sensor S7 for detecting the air intake passage pressure PB are input in FIECU (12), FIECU (12) determines the signals.

Subsequently, the determination result is basically transmitted to motor ECU (11). For example, the driving and regeneration of the motor M are performed by power drive unit (21) according to control commands from motor ECU (11).

Thus, the objection to the drawings and the 35 USC §112, first and second paragraph, rejections, should be withdrawn.

The Examiner has rejected the claims as follows:

1. Claim 1 under 35 USC §102(e) as anticipated by U.S. Patent 6,343,246 to Matsubara et al. (hereinafter "Matsubara et al.").
2. Claims 2 and 3 under 35 USC §103(a) as unpatentable over Matsubara et al. in view of U.S. Patent 6,327,850 to Yasui et al. (hereinafter "Yasui et al.").
3. Claims 4 and 5 under 35 USC §103(a) as unpatentable over Matsubara et al. in view of U.S. Patent 6,009,965 to Takanohashi et al. (hereinafter "Takanohashi et al.") and U.S. Patent 6,079,629 to Morikawa et al. (hereinafter "Morikawa et al.").

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4. Claims 6 and 7 under 35 USC §103(a) as unpatentable over Matsubara et al. in view of Takanohashi et al., Morikawa et al. and Yasui et al.

Matsubara et al. has a U.S. filing date of July 27, 2000, which is subsequent to the foreign priority date of October 24, 1999 claimed in the instant application. Thus, Matsubara et al. is not a proper §102(e) reference and all these rejections may be overcome by filing a verified English translation of the foreign priority document JP 11-310348.

As English translation of Matsubara et al. is attached hereto.

Thus, all prior art rejections should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 1-13, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

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In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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 Substitute Abstract of the Disclosure
 Translation of JP 11-310348
 Amendment Transmittal
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